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EXAMINER	
NGUYEN, LUONG TRUNG	

ART UNIT	PAPER NUMBER
2622	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/922,507	Applicant(s) CHO, KWANG-BO	
	Examiner LUONG T. NGUYEN	Art Unit 2622	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 February 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

DETAILED ACTION

1. It is noted that Art Unit 2612 has been changed to Art Unit 2622.

Response to Arguments

2. Applicant's arguments with respect to claims 1-24 filed on 2/16/2006 have been fully considered but they are not persuasive.

In re pages 8-9, Applicant argues that Fossum '100 fails to show how a color pixel element's responsivity to light may be varied by varying the shape, depth and position of the photoreceptor.

In response, regarding claim 13, it is noted that the features upon which applicant relies (i. e., *a color pixel element's responsivity to light may be varied by varying the shape, depth and position of the photoreceptor*) is not recited in the rejected claim(s). Instead, the Applicant amended claim 13 with limitation "the device geometry of each photoreceptor comprising a size, a shape, a depth and a position" and recited limitations "a responsivity to light that is a function of the first geometry of the photoreceptor "; "a responsivity to light that is a function of the second geometry of the photoreceptor"; "a responsivity to light that is a function of the third geometry of the photoreceptor". The Examiner considers that claim 13 as amended still does not distinguish from Fossum et al. Fossum et al. discloses a photodiode (photoreceptor) comprises a size, an area (this area includes a shape), Column 3, Lines 22-51. Fossum et al., further, discloses a photodiode PD has a depth in a substrate as shown in Figure 2. Each color pixel R,

G, B, corresponds to each photodiode, which is located in a position in a color image sensor as shown in Figure 1A, 1B. Fossum et al. discloses that the collection efficiently (responsivity to light) is proportional to the size of the collection area, Column 3, Lines 22-51. This indicates that the collection efficiently is a function of the size; this also indicates that the collection efficiently is a function of geometry, since geometry comprises the size. It is noted that claim 13 does not require “a responsivity to light that is a function of a shape, depth and position”.

In re pages 9-10, Applicant argues that Perregaux does teach that a photodiode size and shape may be varied to alter the spatial sensitivity of the photodiode, Perregaux fails to teach that the depth and position of the photodiode may also be varied.

In response, regarding claim 1, it is noted that the features upon which applicant relies (i. e., *the depth and position of the photodiode may also be varied to alter the spatial sensitivity of the photodiode*) is not recited in the rejected claim(s). Instead, the Applicant amended claim 1 with limitation “the device geometry of each photoreceptor comprising a size, a shape, a depth and a position” and recited limitations “a responsivity to light that is a function of the first geometry of the photoreceptor ”; “a responsivity to light that is a function of the second geometry of the photoreceptor”. The Examiner considers that claim 1 as amended still does not distinguish from Fossum et al. Fossum et al. discloses a photodiode (photoreceptor) comprises a size, an area (this area includes a shape), Column 3, Lines 22-51. Fossum et al., further, discloses a photodiode PD has a depth in a substrate as shown in Figure 2. Each color pixel R, G, B, corresponds to each photodiode, which is located in a position in a color image sensor as shown in Figure 1A, 1B. Fossum et al. discloses that the collection efficiently (responsivity to

light) is proportional to the size of the collection area, Column 3, Lines 22-51. This indicates that the collection efficiently is a function of the size; this also indicates that the collection efficiently is a function of geometry, since geometry comprises the size. It is noted that claim 1 does not require "a responsivity to light that is a function of depth and position".

In re pages 10-11, Applicant argues that the combination of Fossum '100 and Perregaux fail to teach that the responsivity of the output signal of the photoreceptor is controllable by changing the depth and position of the photoreceptor.

In response, regarding claim 21, it is noted that the features upon which applicant relies (i. e., *the responsivity of the output signal of the photoreceptor is controllable by changing the depth and position of the photoreceptor*) is not recited in the rejected claim(s). Instead, the Applicant amended claim 21 with limitation "the device geometry of each photoreceptor comprising a size, a shape, a depth and a position" and recited limitations "the responsivity of the output signal of the photoreceptor to the first color being controllable by changing the first geometry"; "the responsivity of the output signal of the photoreceptor to the second color being controllable by changing the second geometry"; "the responsivity of the output signal of the photoreceptor to the third color being controllable by changing the third geometry. The Examiner considers that claim 21 as amended still does not distinguish from Fossum et al. Fossum et al. discloses a photodiode (photoreceptor) comprises a size, an area (this area includes a shape), Column 3, Lines 22-51. Fossum et al., further, discloses a photodiode PD has a depth in a substrate as shown in Figure 2. Each color pixel R, G, B, corresponds to each photodiode, which is located in a position in a color image sensor as shown in Figure 1A, 1B. Fossum et al.

discloses that the collection efficiently (the responsivity of the output signal) is proportional to the size of the collection area, Column 3, Lines 22-51. This indicates that the collection efficiently is controllable by changing the size; this also indicates that the collection efficiently is controllable by changing geometry, since geometry comprises the size. It is noted that claim 21 does not require "the responsivity of the output signal of the photoreceptor is controllable by changing the depth and position of the photoreceptor".

In re page 11, Applicant argues that McDaniel does not teach or suggest that a photodiode depth and position may be altered the photodiode responsivity.

In response, see discussion for this feature as regarding to claim 1 discussed above.

In re page 12, Applicant argues that Fossum '483 does not teach or suggest the altering of a photodiode size, shape, depth and position to alter the photodiode's sensitivity.

In response, see discussion for this feature as regarding to claim 1 discussed above.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 13-15 are rejected under 35 U.S.C. 102(e) as being anticipated by Fossum et al. (US 6,137,100).

Regarding claim 13, Fossum et al. discloses a CMOS color pixel assembly (CMOS image sensor, Column 2, Lines 5-12), comprising:

a plurality of macro pixels (macro pixel, Column 2, Lines 5-30), each macro pixel of the plurality of macro pixels, comprising:

at least three color pixel elements of substantially equal pixel area (Red, Blue, Green, Figures 1A, 1B, Column 2, Lines 31-59), each color pixel element including a photoreceptor (photodiode, column 3, Lines 22- 51) having a device geometry, responsive to receiving light, to generate an output signal indicative of an amount of light photons received (Column 3, Lines 22-61), the device geometry of each photoreceptor comprising a size, a shape, a depth and a position (Fossum et al. discloses a photodiode comprises a size, an area which includes a shape, Column 3, Lines 22-51. Fossum et al., further, discloses a photodiode PD has a depth in a substrate as shown in Figure 2. Each color pixel R, G, B, corresponds to each photodiode, which is located in a position in a color image sensor as shown in Figure 1A, 1B);

a first one of the color pixel elements, configured and arranged to receive a first color of light (red color, Figure 1B), the photoreceptor of the first one of the color pixel elements having a first geometry and a responsivity to light that is a function of the first geometry of the photoreceptor (the collection efficiently is proportional to the size of the collection area; this indicates that the collection efficiently is a function of the size; this also indicates that the collection efficiently is a function of geometry, since geometry comprises the size; Column 3, Lines 22-51);

a second one of the color pixel elements configured and arranged to receive a second color of light (blue color, Figure 1B) different than the first color of light, the photoreceptor of the second one of the color pixel elements having a second geometry and a responsivity to light that is a function of the second geometry (the collection efficiently is proportional to the size of the collection area; this indicates that the collection efficiently is a function of the size; this also indicates that the collection efficiently is a function of geometry, since geometry comprises the size; Column 3, Lines 22-51);

a third one of the color pixel elements, configured and arranged to receive a third color of light (green color, Figure 1B) different than the first color of light and the second color of light, the photoreceptor of the third one of the color pixel elements having a third geometry and a responsivity to light that is a function of the third geometry of the photoreceptor (the collection efficiently is proportional to the size of the collection area; this indicates that the collection efficiently is a function of the size; this also indicates that the collection efficiently is a function of geometry, since geometry comprises the size; Column 3, Lines 22-51).

Regarding claim 14, Fossum et al. discloses the first geometry, the second geometry, and the third geometry are selected such that the responsivity of the output signal of the first one of the color pixel elements to the first color of light, and the responsivity of the output signal of the second one of the color pixel elements to the second color of light, and the responsivity of the output signal of the third one of the color pixel elements to the third color of light is a predetermined ratio (ratio 2.5 Vb:1.5 Vr:1.0Vg (column 1, Lines 52-57).

Regarding claim 15, Fossum et al. discloses the predetermined ratio is about 1:1:1 (Figure 1A).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1, 4-7, 10-12, 19-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fossum et al. (US 6,137,100) in view of Perregaux et al. (US 5,119,181).

Regarding claim 1, Fossum et al. discloses a macro-pixel (macro pixel, Column 2, Lines 5-30), comprising:

at least two color pixel elements of substantially equal pixel area (Red, Blue , Green, Figures 1A, 1B, Column 2, Lines 31-59), each color pixel element including a photoreceptor (photodiode, Column 3, Lines 22-51) having a device geometry, responsive to receiving light, to generate an output signal indicative of an amount of light photons received (Column 3, Lines 22-61), the device geometry of each photoreceptor comprising a size, a shape, a depth and a position (Fossum et al. discloses a photodiode comprises a size, an area which includes a shape, Column 3, Lines 22-51. Fossum et al., further, discloses a photodiode PD has a depth in a substrate as shown in Figure 2. Each color pixel R, G, B, corresponds to each photodiode, which is located in a position in a color image sensor as shown in Figure 1A, 1B);

the photoreceptor of a first of the color pixel elements receiving a first color of light (Red color, Figure 1B) and having a first geometry and a responsivity to said first color of light that is a function of the first geometry (the collection efficiency is proportional to the size of the collection area; this indicates that the collection efficiently is a function of the size; this also indicates that the collection efficiently is a function of geometry, since geometry comprises the size; Column 3, Lines 22-51);

the photoreceptor of a second of the color pixel elements receiving a second color of light (Blue color, Figure 1B) different from the first color of light and a responsivity to said second color of light that is a function of the second geometry (the collection efficiency is proportional to the size of the collection area; this indicates that the collection efficiently is a function of the size; this also indicates that the collection efficiently is a function of geometry, since geometry comprises the size; Column 3, Lines 22-51);

the first geometry and the second geometry being such that the responsivity of the output signal of the first of the color pixel element to the first color of light is a predetermined ratio of the responsivity of the output signal of the second of the color pixel elements to the second color of light (ratio 2.5 Vb: 1.5Vr : 1.0Vg, Column 1, Lines 52-57).

Fossum et al. fails to specifically disclose a second of the color pixel elements having a second geometry different from the first geometry. However, Perregeaux et al. discloses a color array, in which photodiode shape can be altered to change the spatial sensitivity of the individual photodiodes if required (Column 5, Lines 25-32, Lines 60-62). This means that the photodiode shape of the photodiode corresponds to a second color (such as Blue color) is different from the photodiode shape of the photodiode corresponds to a first color (such as Red color); note that the

spectral sensitivity of Red color and Blue color are different. Therefore, it would have obvious to one of ordinary skill in the art at the time the invention was made to modify the device in Fossum et al. by the teaching of Perregaux et al. in order to change the spatial sensitivity of the individual photodiodes if required (Column 5, Lines 60-62).

Regarding claim 4, Fossum et al. discloses the predetermined ratio is about 1:1 (Figure 1A).

Regarding claim 5, Fossum et al. discloses a third one of the color pixel elements, to receive a third color of light (green color, Figure 1B) different than the first color of light and the second color of light, the photoreceptor of the third one of the color pixel elements having a third geometry and a responsivity to light that is a function of the third geometry of the photoreceptor (the collection efficiently is proportional to the size of the collection area, Column 3, Lines 22-51).

Regarding claim 6, Fossum et al. discloses the first geometry, the second geometry, and the third geometry are selected such that the responsivity of the output signal of the first one of the color pixel elements to the first color of light, and the responsivity of the output signal of the second one of the color pixel elements to the second color of light, and the responsivity of the output signal of the third one of the color pixel elements to the third color of light is a predetermined ratio (ratio 2.5 Vb:1.5 Vr:1.0Vg, Column 1, Lines 52-57).

Regarding claim 7, Fossum et al. discloses the predetermined ratio is about 1:1:1 (Figure 1A).

Regarding claims 10-11, 19-20, Fossum et al. fails to specifically disclose at least one of the color pixel elements further comprises at least one switch coupled to the photoreceptor to vary the device geometry. However, Perregeaux et al. discloses a color array, in which photodiode shape can be altered to change the spatial sensitivity of the individual photodiodes if required (Column 5, Lines 25-32, Lines 60-62). Therefore, it would have obvious to one of ordinary skill in the art at the time the invention was made to modify the device in Fossum et al. by the teaching of Perregaux et al. in order to change the spatial sensitivity of the individual photodiodes if required (Column 5, Lines 60-62).

Regarding claim 12, Fossum et al. discloses a color pixel assembly, the color pixel assembly (CMOS image sensor, Column 2, Lines 5-12) including a plurality of macro pixels (macro pixels, Column 2, Lines 5-30).

Regarding claim 21, Fossum et al. discloses a color pixel assembly (CMOS image sensor, Column 2, Lines 5-12) including at least one macro pixel (macro pixel, Column 2, Lines 5-30), the macro pixel comprising:

at least three color pixel elements having equal pixel areas, (Red, Blue, Green, Figures 1A, 1B, Column 2, Lines 31-59), each color pixel element including a photoreceptor (photodiode, column 3, Lines 22- 51) having a device geometry, responsive to receiving light, to

generate an output signal indicative of an amount of light photons received (Column 3, Lines 22-61), the device geometry of each photoreceptor comprising a size, a shape, a depth and a position (Fossum et al. discloses a photodiode comprises a size, an area which includes a shape, Column 3, Lines 22-51. Fossum et al., further, discloses a photodiode PD has a depth in a substrate as shown in Figure 2. Each color pixel R, G, B, corresponds to each photodiode, which is located in a position in a color image sensor as shown in Figure 1A, 1B);

a first one of the color pixel elements, configured and arranged to receive a first color of light (red color, Figure 1B), the photoreceptor of the first of the color pixel elements having a first geometry and a responsivity to light that is a function of the first geometry of the photoreceptor, the responsivity of the output signal of the photoreceptor to the first color being controllable by changing the first geometry (the collection efficiently is proportional to the size of the collection area; this indicates that the collection efficiently is controllable by changing the size; this also indicates that the collection efficiently is controllable by changing geometry, since geometry comprises the size; Column 3, Lines 22-51);

a second of the color pixel elements configured and arranged to receive a second color of light (blue color, Figure 1B) different than the first color of light, the photoreceptor of the second one of the color pixel elements having a second geometry and a responsivity to light that is a function of the second geometry, the responsivity of the output signal of the photoreceptor to the second color being controllable by changing the second geometry (the collection efficiently is proportional to the size of the collection area; this indicates that the collection efficiently is controllable by changing the size; this also indicates that the collection efficiently is controllable by changing geometry, since geometry comprises the size; Column 3, Lines 22-51);

a third one of the color pixel elements, configured and arranged to receive a third color of light (green color, Figure 1B) different than the first color of light and the second color of light, the photoreceptor of the third one of the color pixel elements having a third geometry and a responsivity to light that is a function of the third geometry of the photoreceptor, the responsivity of the output signal of the photoreceptor to the third color being controllable by changing the third geometry (the collection efficiently is proportional to the size of the collection area; this indicates that the collection efficiently is controllable by changing the size; this also indicates that the collection efficiently is controllable by changing geometry, since geometry comprises the size; Column 3, Lines 22-51).

Fossum et al. fails to specifically disclose each color pixel element including at least one switch configured to selectively change the device geometry. However, Perregeaux et al. discloses a color array, in which photodiode shape can be altered to change the spatial sensitivity of the individual photodiodes if required (Column 5, Lines 25-32, Lines 60-62). Therefore, it would have obvious to one of ordinary skill in the art at the time the invention was made to modify the device in Fossum et al. by the teaching of Perregaux et al. in order to change the spatial sensitivity of the individual photodiodes if required (Column 5, Lines 60-62).

Regarding claim 22, Fossum et al. discloses the first geometry, the second geometry, and the third geometry are controlled such that the responsivity of the output signal of the first one of the color pixel elements to the first color of light, and the responsivity of the output signal of the second one of the color pixel elements to the second color of light, and the responsivity of the

output signal of the third one of the color pixel elements to the third color of light is a predetermined ratio (ratio 2.5 Vb:1.5 Vr:1.0Vg (Column 1, Lines 52-57).

Regarding claim 23, Fossum et al. discloses the predetermined ratio is about 1:1:1 (Figure 1A).

7. Claims 2-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fossum et al. (US 6,137,100) in view of Perregaux et al. (US 5,119,181) further in view of McDaniel et al. (US 6,040,592).

Regarding claim 2, Fossum et al. and Perregaux et al. fail to specifically disclose the photoreceptor of each color pixel element is selected from the group consisting of n-wells, n+ diffusion, p-wells, p+ diffusion, and photogates. However, McDaniel et al. teaches that a photodiode is created between ground, a common node having electrical contact with the substrate, and the diffusion 209, the diffusion 209 is doped as an N+ diffusion region (Column 3, Lines 29-35). Therefore, it would have obvious to one of ordinary skill in the art at the time the invention was made to modify the device in Fossum et al. and Perregaux et al. by the teaching of McDaniel et al. in order to make ohmic contact to the well (column 3, Lines 33-35).

Regarding claim 3, Fossum et al. fails to specifically disclose the photoreceptor of each color pixel element is an n+ diffusion. However, McDaniel et al. teaches that a photodiode is created between ground, a common node having electrical contact with the substrate, and the diffusion 209, the diffusion 209 is doped as an N+ diffusion region (Column 3, Lines 29-35). Therefore, it would have obvious to one of ordinary skill in the art at the time the invention was

made to modify the device in Fossum et al. by the teaching of McDaniel et al. in order to make ohmic contact to the well (column 3, Lines 33-35).

8. Claims 8-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fossum et al. (US 6,137,100) in view of Perregaux et al. (US 5,119,181) further in view of Fossum et al. (US 5,949,483).

Regarding claim 8, Fossum et al. ('100) and Perregaux et al. fail to specifically disclose a microlens photonically coupled to at least one of the color pixel elements. However, Fossum et al. ('483) discloses an active pixel sensor array, in which each pixel corresponding to red filter 600, blue filter 604, green filter 610 is covered by microlenses 115A, 115B, 115C (Figure 5A, Column 7, Line 58 – Column 8, Line 13). Therefore, it would have obvious to one of ordinary skill in the art at the time the invention was made to modify the device in Fossum et al. ('100) and Perregaux et al. by the teaching of Fossum et al. ('483) in order to focus incoming light onto pixel.

Regarding claim 9, Fossum et al. ('100) and Perregaux et al. fail to specifically disclose corresponding microlens photonically coupled to each of the color pixel elements. However, Fossum et al. ('483) discloses an active pixel sensor array, in which each pixel corresponding to red filter 600, blue filter 604, green filter 610 is covered by microlenses 115A, 115B, 115C (Figure 5A, Column 7, Line 58 – Column 8, Line 13). Therefore, it would have obvious to one of ordinary skill in the art at the time the invention was made to modify the device in Fossum et

al. ('100) and Perregaux et al. by the teaching of Fossum et al. ('483) in order to focus incoming light onto pixel.

9. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fossum et al. (US 6,137,100) in view of McDaniel et al. (US 6,040,592).

Regarding claim 16, Fossum et al. fails to specifically disclose the photoreceptor of each color pixel element is selected from the group consisting of n-wells, n+ diffusion, p-wells, p+ diffusion, and photogates. However, McDaniel et al. teaches that a photodiode is created between ground, a common node having electrical contact with the substrate, and the diffusion 209, the diffusion 209 is doped as an N+ diffusion region (Column 3, Lines 29-35). Therefore, it would have obvious to one of ordinary skill in the art at the time the invention was made to modify the device in Fossum et al. by the teaching of McDaniel et al. in order to make ohmic contact to the well (Column 3, Lines 33-35).

10. Claims 17-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fossum et al. (US 6,137,100) in view of Fossum et al. (US 5,949,483).

Regarding claim 17, Fossum et al. ('100) fails to specifically disclose a microlens photonically coupled to at least one of the color pixel elements. However, Fossum et al. ('483) discloses an active pixel sensor array, in which each pixel corresponding to red filter 600, blue filter 604, green filter 610 is covered by microlenses 115A, 115B, 115C (Figure 5A, Column 7, Line 58 – Column 8, Line 13). Therefore, it would have obvious to one of ordinary skill in the

art at the time the invention was made to modify the device in Fossum et al. ('100) by the teaching of Fossum et al. ('483) in order to focus incoming light onto pixel.

Regarding claim 18, Fossum et al. ('100) fails to specifically disclose corresponding microlens photonically coupled to each of the color pixel elements. However, Fossum et al. ('483) discloses an active pixel sensor array, in which each pixel corresponding to red filter 600, blue filter 604, green filter 610 is covered by microlenses 115A, 115B, 115C (Figure 5A, Column 7, Line 58 – Column 8, Line 13). Therefore, it would have obvious to one of ordinary skill in the art at the time the invention was made to modify the device in Fossum et al. ('100) by the teaching of Fossum et al. ('483) in order to focus incoming light onto pixel.

11. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fossum et al. (US 6,137,100) in view of Perregaux et al. (US 5,119,181) further in view of McDaniel et al. (US 6,040,592).

Regarding claim 24, Fossum et al. and Perrgaux et al. fail to specifically disclose the photoreceptor of each color pixel element is selected from the group consisting of n-wells, n+ diffusion, p-wells, p+ diffusion, and photogates. However, McDaniel et al. teaches that a photodiode is created between ground, a common node having electrical contact with the substrate, and the diffusion 209, the diffusion 209 is doped as an N+ diffusion region (Column 3, Lines 29-35). Therefore, it would have obvious to one of ordinary skill in the art at the time the invention was made to modify the device in Fossum et al. by the teaching of McDaniel et al. in order to make ohmic contact to the well (column 3, Lines 33-35).

Conclusion

12. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to LUONG T. NGUYEN whose telephone number is (571) 272-7315. The examiner can normally be reached on 7:30AM - 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, DAVID L. OMETZ can be reached on (571) 272-7593. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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04/28/06

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